

Appl. No. : 10/666,618  
Filed : September 18, 2003

### REMARKS

Claims 4-10 and 15-20 are pending in this application. Claims 1-3 and 11-14 have been canceled as drawn to nonelected subject matter. Claims 4, 7, 15-17 and 20 have been amended. Support for the amendments is found in the specification and claims as filed.

#### **Response to Restriction Requirement**

A Restriction Requirement has been imposed in this application. In connection therewith, it is asserted that the application claims the following inventions: Claims 1-3 and 11-14, drawn to chemical compounds, classified in class 556, subclass 52 *inter alia* (Group I); and Claims 4-10 and 15-20, drawn to catalyst precursors, classified in class 502, subclass 152 *inter alia* (Group II). Applicants hereby affirm their election, without prejudice, of the invention of Group II, including Claims 4-10 and 15-20, and cancel without prejudice Claims 1-3 and 11-14 as drawn to a non-elected invention.

#### **Rejections under 35 U.S.C. § 112, first paragraph**

Claims 4-10 and 15-20 are rejected under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claims 4, 7, 15, and 20 have been amended to clarify the structure of the siloxane functional group of the dehydroxylated silica support. Support for the amendment is found in Reaction Formula 5 following paragraph [0023].

The Office Action questions whether there is physical evidence of the presence of Si-OA' moieties on the surface of the silica support. To satisfy the written description requirement, a patent application must describe the invention in sufficient detail that one of skill in the relevant art could conclude that the inventor was in possession of the claimed invention at the time the application was filed. *See Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, (Fed. Cir. 1991). In view of the recent decision by the Federal Circuit, *Union Oil of California*, it is clear that an Applicant need not precisely recite each and every element of a claim limitation in the specification in order to satisfy the written description requirement. *See Union Oil of Cal. v. Atlantic Richfield Co.*, 208 F.3d 989 (Fed. Cir. 2000).

Example 8 describes an experiment that demonstrates the formation of the chemical bond between a siloxane O atom and a t-butyl group (corresponding to A') on the silica surface upon

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the breakage of the C-O bond of tertiary butyl decyl ether (t-Butyl-O-(CH<sub>2</sub>)<sub>9</sub>-CH<sub>3</sub>). The dehydroxylated silica support was reacted with the tertiary butyl decyl ether in a basic ethanol solution. After removal of unreacted tertiary butyl decyl ether, <sup>1</sup>H NMR analysis showed that most of the residual compound was decanol (HO-(CH<sub>2</sub>)<sub>9</sub>-CH<sub>3</sub>), indicating that t-butyl is bonded to the silica support. Tertiary butyl decyl ether in basic ethanol solution in the absence of dehydroxylated silica is unreactive. Accordingly, the data of Example 8 clearly demonstrate that Applicants were in possession of the invention as claimed, namely, the Si-OA' moiety.

Claim 1 and Claim 20 have been amended to clarify that no peroxide species are involved.

Accordingly, Applicants respectfully request withdrawal of the rejection.

**Rejections under 35 U.S.C. § 112, second paragraph**

Claims 4-10 and 15-20 are rejected under 35 U.S.C. § 112, second paragraph as indefinite.

The formula of line 2 of Claim 4 has been amended to indicate a bond between the Cp ring and the metal atom M. There are no pentavalent carbon atoms in the formula of line 2 of Claim 4 as amended. Claims 4, 7, 15-17, and 20 have been amended to correct various informalities. Accordingly, Applicants respectfully request withdrawal of the rejection.

**Claim Rejection - 35 U.S.C. § 102(a)**

Claims 4-10 and 15-20 have been rejected under 35 U.S.C. § 102(a) as anticipated by *J. Organomet. Chem.*, Vol. 552, pp. 313-317 (1998) (hereinafter "Lee I") or Korean Laid-Open Patent 98-25282 (hereinafter "Lee II"). "A rejection for anticipation under section 102 requires that each and every limitation of the claimed invention be disclosed in a single prior art reference." *See, e.g., In re Paulsen*, 31 U.S.P.Q.2d 1671 (Fed. Cir. 1994). Lee I and Lee II do not disclose every element of Applicants' claims, and therefore cannot be considered as anticipating references under 35 U.S.C. § 102(a).

Lee I and Lee II teach various metallocene compounds incorporating alkoxy groups. Lee I and Lee II also teach anchoring metallocenes on a silica support, such as dehydroxylated silica (Lee II). However, Lee I and Lee II do not specifically disclose supported metallocene catalysts wherein the metallocene comprises a moiety corresponding to A' as presently claimed in Claims 4 and 7 or -(CH<sub>2</sub>)<sub>a</sub>-CR''<sub>2</sub>-Z-CR'<sub>2</sub>G as presently claimed in Claim 15 and 20, which is

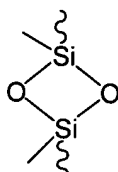
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subsequently bonded to a silicon atom of the dehydroxylated silica support via an oxygen atom as recited in the pending claims.

Applicants have discovered that supported catalysts derived from metallocenes containing such groups exhibit unexpectedly superior properties including reduced reactor fouling and better defined bulk density of polymer produced by the supported catalyst when compared to metallocenes containing other alkoxy groups. Accordingly, Applicants respectfully request that the rejection be withdrawn.

**Claim Rejection - 35 U.S.C. § 102(a)**

Claims 4-6 and 15-19 have been rejected under 35 U.S.C. §102(a) as anticipated by EP-293,815 (hereinafter "Antberg et al."). The pending claims recite a dehydroxylated silica support of the structure:



Antberg et al. discloses a silica support that is not dehydroxylated, but instead has surface hydroxyl groups. When a support comprising surface hydroxyl groups, as disclosed in Antberg et al., is reacted with a metallocene catalyst, the silicon atom of the catalyst bonds to the support, and the alkyl group previously bonded to the silicon atom of the catalyst is lost as a free alcohol. See, for example, the reaction depicted on page 7, lines 1-20 of Antberg et al., wherein the catalyst is bonded to the support and ethanol is lost. In contrast to the invention as presently claimed, a moiety corresponding to A' as presently claimed in Claims 4 and 7 or  $-(CH_2)_a-CR''_2-Z-CR'_2G$  as presently claimed in Claim 15 is bonded to a silicon atom of the dehydroxylated support via an oxygen atom. Applicants have discovered that dehydroxylated silica supported catalysts derived from metallocenes containing such groups exhibit unexpectedly superior properties including reduced reactor fouling and better defined bulk density of polymer produced by the supported catalyst when compared to metallocenes supported on hydroxylated silica supports.

Antberg et al. does not disclose a dehydroxylated silica support, nor a supported metallocene catalyst having bonded thereto a moiety corresponding to A' or  $-OCR''_2OCR'_2G$ ,

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and therefore cannot anticipate Claims 4-6 and 15-19. Accordingly, Applicants respectfully request that the rejection be withdrawn.

**Claim Rejection - 35 U.S.C. § 102(b) and 35 U.S.C. §103(a)**

Claims 4-6 and 15-19 have been rejected under 35 U.S.C. §102(b) as anticipated by US 5,814,574 (hereinafter "McNally"), or, in the alternative, as obvious under 35 U.S.C. §103(a) over McNally. To articulate a *prima facie* case of obviousness, the PTO must, *inter alia*, cite prior art that teaches or suggests all the claimed limitations. *In re Royka*, 490 F.2d 981 (C.C.P.A. 1974). McNally fails to teach or suggest all of the claimed limitations.

As discussed above in reference to the rejection over Antberg et al., the pending claims recite a dehydroxylated silica support. McNally discloses drying a silica support at a temperature of 500°C, a temperature insufficient to dehydroxylate the support. Contrary to the assertions in the Office Action, surface hydroxyl groups of a silica support cannot react with a metallocene containing methoxy groups to form surface methoxy groups on the silica. The methoxy is lost as methanol. As Applicants discuss in the specification, when a hydroxylated silica is reacted with a metallocene catalyst (see Reaction Formula 2), the metallocene catalyst, which includes an -OR' group, bonds to the support in a reaction that results in the production of an alcohol R'OH. Accordingly, the R' group of the metallocene catalyst is not bonded to the support as a result of a reaction with a hydroxylated silica support. Only when a dehydroxylated silica is reacted with a metallocene catalyst comprising a moiety corresponding to A' as presently claimed in Claims 4 and 7 or  $-(CH_2)_a-CR''_2-Z-CR'_2G$  as presently claimed in Claims 15 and 20, is the moiety comprising A' or  $-(CH_2)_a-CR''_2-Z-CR'_2G$  bonded to a silicon atom of the dehydroxylated support via an oxygen atom.

Applicants have discovered that dehydroxylated silica supported catalysts derived from metallocenes containing such groups exhibit unexpectedly superior properties including reduced reactor fouling and better defined bulk density of polymer produced by the supported catalyst when compared to metallocenes supported on hydroxylated silica supports.

McNally does not disclose a dehydroxylated silica support, nor a supported metallocene catalyst having bonded thereto a moiety corresponding to A' or  $-OCR''_2OCR'_2G$ , and therefore cannot anticipate or render obvious any of the pending claims. Accordingly, Applicants respectfully request that the rejection be withdrawn.

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**Claim Rejection - 35 U.S.C. §103(a)**

Claims 4-10 and 15-20 have been rejected under 35 U.S.C. §103(a) as anticipated by EPO 0 839 836 (hereinafter "Sancho Royo"). As discussed above in reference to the rejection over Antberg et al. and McNalley, the pending claims recite a dehydroxylated silica support. Sancho Royo discloses a silica support, but not a dehydroxylated silica support. Accordingly, for similar reasons as stated in regard to the rejection over McNalley, Sancho Royo does not render the pending claims obvious. Accordingly, Applicants respectfully request that the rejection be withdrawn.

**Claim Rejection - 35 U.S.C. §103(a)**

Claims 4-10 and 15-20 have been rejected under 35 U.S.C. §103(a) as anticipated by U.S. Publ. No. 2003/0144135 A1 (hereinafter "Llinas et al."). As discussed above in reference to the rejection over Antberg et al. and McNalley, the pending claims recite a dehydroxylated silica support. Llinas et al. discloses a silica support, but not a dehydroxylated silica support. Accordingly, for similar reasons as stated in regard to the rejection over McNalley, Llinas et al. does not render the pending claims obvious. Accordingly, Applicants respectfully request that the rejection be withdrawn.

**CONCLUSION**

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns that might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number below.

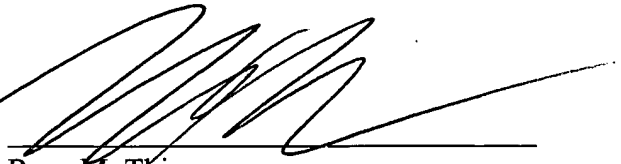
Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

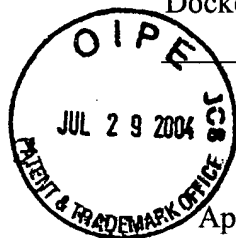
Dated:

July 26, 2004

By:



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Attorney of Record  
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**AMENDMENT / RESPONSE TRANSMITTAL**

Applicant : Lee, et al.  
 App. No. : 10/666/618  
 Filed : September 18, 2003  
 For : SUPPORTED  
 METALLOCENE CATALYST  
 AND OLEFIN  
 POLYMERIZATION USING  
 THE SAME  
 Examiner : Pasterczyk, J. W.  
 Art Unit : 1755

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

July 26, 2004

(Date)

Rose M. Thiessen, Reg. No. 40,202

Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450

Sir:

Transmitted herewith for filing in the above-identified application are the following enclosures:

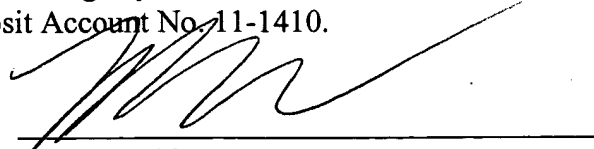
- (X) Amendment in 15 pages.
- (X) 4 sheets of replacement drawings.

The fee has been calculated as shown below:

FEE CALCULATION				
FEE TYPE		FEE CODE	CALCULATION	TOTAL
Total Claims	13 - 20 = 0	1202 (\$18)	0 x 18 =	\$0
Independent Claims	4 - 6 = 0	1201 (\$86)	0 x 86 =	\$0
Multiple Claim		1203 (\$290)		\$0
1 Month Extension		1251 (\$110)		\$0
2 Month Extension		1252 (\$420)		\$0
3 Month Extension		1253 (\$950)		\$0
			<b>TOTAL FEE DUE</b>	<b>\$0</b>

- (X) Return prepaid postcard.

- (X) Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.



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